

at the pinch point corresponding to valve 7, and the secondary sampling line connecting container B-2 is cut below the valve or clamp.

[0042] A similar process is performed for each of the remaining sample containers B-3, B-4, and B-5.

[0043] Thus, exemplary embodiments have been fully described above with reference to the drawing figures. Although the invention has been described based upon these exemplary embodiments, it would be apparent to those of skill in the art that certain modifications, variations, and alternative constructions could be made to the described embodiments within the spirit and scope of the invention.

What is claimed is:

1. A system for withdrawing discrete fluid samples from a vessel adapted to contain a fluid;

a main sampling line in fluid communication with the vessel;

a pump in fluid communication with said main sampling line and adapted to selectively pump fluid from in the main sampling line in a first direction away from the vessel or a second direction toward the vessel;

a first vent port in fluid communication with said main sampling line and disposed on a first side of said pump;

a second vent port in fluid communication with said main sampling line and disposed on a second side of said pump;

one or more sample containers in fluid communication with a portion of said main sampling line on the second side of said pump; and

a flow control system adapted to be selectively configured to open or close each of said first and second vent ports, open or close one or more portions of said main sampling line, and open or close each sample container, wherein,

in a first configuration of said flow control system, said first and second vent ports are closed, said main sampling line is open on the first and second sides of said pump, and at least one sample vessel is open, so that the pump can be operated in a first direction to move an amount of fluid from the vessel, through a portion of the main sampling line, and into the open sample container;

in a second configuration of said flow control system, said first vent port is closed, said second vent port is open, each of the one or more sample vessels is closed, and a portion of said main sampling line on the first side of said pump is open so that the pump can be operated in a second direction to move fluid disposed in said main sampling line into the vessel without withdrawing fluid from the at least one sample container; and

in a third configuration of said flow control system, said first vent port is open, said second vent port is closed, said main sampling line is closed on the first side of said pump and opened on the second side of said pump, and the at least one sample container is open so that the pump can be operated in the first direction to move fluid disposed in the main sampling line and into the open sample container without withdrawing additional fluid from the vessel.

2. The system of claim 1, wherein said flow control system comprises:

a first valve in said main sampling line between said vessel and said first vent port;

a second valve in said first vent port;

a third valve in said second vent port; and

a fourth valve in said main sampling line between said second vent port and said sample containers.

3. The system of claim 2, wherein each of said valves is a pinch valve.

4. The system of claim 1, wherein said vessel comprises a fermentor, a bioreactor, or a medium batching holding vessel.

5. The system of claim 1, further comprising a filter associate with each of said first and second vent ports.

6. The system of claim 5, wherein each filter comprises a sterilizing grade gas filter with a 0.2 μm membrane.

7. The system of claim 1, wherein said pump comprises a peristaltic pump.

8. The system of claim 1, further comprising an automated control system adapted to:

(a) automatically configure said flow control system in the first configuration,

(b) automatically operate said pump in the first direction for a first prescribed period of time when said flow control system is in the first configuration,

(c) automatically configure said flow control system in the second configuration,

(d) automatically operate said pump in the second direction for a second prescribed period of time when said flow control system is in the second configuration,

(e) automatically configure said flow control system in the third configuration, and

(f) automatically operate said pump in the first direction for a third prescribed period of time when said flow control system is in the third configuration.

9. The system of claim 1, wherein each sample container is connected to a respective secondary sampling line branching from said main sampling line and said flow control system comprises a sample valve associated with each sample container and disposed in each secondary sampling line.

10. The system of claim 2, wherein each sample container is connected to said main sampling line by an associated secondary sampling line, and wherein said flow control system further includes a valve in each secondary sampling line and a valve in said main sampling line between each adjacent pair of secondary sampling lines.

11. The system of claim 2, wherein each sample container is connected to said main sampling line by an associated secondary sampling line, and wherein said flow control system further includes a clamp in each secondary sampling line that may be opened or closed to permit or prevent flow through the associated secondary sampling line and into the sample container.

12. The system of claim 2, wherein said flow control system further includes a rotary valve at which all of the sample containers are connected to the main sampling line and which is configured to selectively connect said main sampling line with one of said sample containers.

13. The system of claim 2, wherein said flow control system further includes a sample manifold connected to said main sampling line and to which each of said sample containers is connected, said sample manifold comprising a stop cock associated with each sample container connected to said manifold for selectively opening a fluid flow path from said main sampling line, through said manifold, and into said sample container.

14. A method for aseptically removing a sample portion of a fluid from a vessel containing the fluid comprising:

A. providing a fluid flow connection between the vessel and a sample container;

B. pumping fluid in a first direction from the vessel to the sample container through the fluid flow connection;